Interactive comment on "An improved coupling model for water flow, sediment transport and bed evolution (CASFE v.1)" *by* S. He et al.

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Review by Phairot Chatanantavet

OK. First of all, I have to say that the Referee # 1 may be wrong about "averaged streamwise velocity at the bed surface must vanish (i.e., $U_b=0$)". It is a depth-averaged streamwise velocity (see page 2434) – it is even written in the abstract. And of course the bed sediment has to move downstream !!! It would be scoured/entrained and transported downstream. Although it has not been shown explicitly, I believe that the authors already included $U_b = 0$ already in section 2.3 in the integral derivation where appropriate in Navier-Stokes equation. However, the writing of the authors does not help readers like referee 1 understand this point clearly as in page 2443 and elsewhere. There is a difference between $U_b = 0$ at the very bed surface (esp. for a fixed bed

condition) and $U_b = U(bar)$ very slightly just above that point used in certain calculations. Referee 1 should at least read the references given (Iverson 2012, 2013; Le and Pitman 2009) before such a criticism as a major reason for rejecting the paper. Remember things get so fast during morphological changes and the bed boundary may not be so clear and keep changing. About the criticism on rainfall part, the authors actually did clarified his/her concerns in the beginning of section 3 (p. 2439) that in this dam –break example, no rainfall should be considered. I think referee 1 is too quick in deciding to reject the paper. Despite some work needed to revise the paper, it got potentials to be publishable (I leave it to the editor). Mostly it has something to do with somewhat lack of text in the paper (such as in Introduction and maybe add a discussion section) besides the model development part. I suggest that the authors ask someone who is a native speaker of English to look over and help with the writing before resubmission (I have done some already). Probably the major novel thing in this paper is the new model developmental scheme differing from previous work; therefore, the authors have to highlight this in the paper well (such as in the abstract) and make their case warranting for publication. The table 1 is a good example. Given the name of the journal, I think this paper's line of work suits the journal.

General comments - You should include a few more specific words in your paper's title to narrow the topic down – currently it is a bit too broad. - The abstract should mostly start with 1-2 general statement about your research. Try something about the modeling of dam break or whatever morphodynamical processes important and why this work is important scientifically and societally. The abstract needs to state after the results that why your paper/work is better than previous models. Your last sentence in the abstract is also very broad. These sentences need to be specific as WHY your work warrants publication. What is NEW here. The last sentence or two of abstract should put it back to implications to the real world why your research helps to improve things and benefit the society/science. Right now the abstract is very short and lacks of any substances. Your conclusion section is quite good – you could use some stuff from there. The abstract needs to be a standalone piece without readers digging into

the paper. - In the abstract, you talk about your work is one-dimensional but starting from Eq. 2, you have presented everything in 3-D equations. You should be clearer in the abstract that your work is 3-D but for this test example case of dam break, you simplify it to be 1-D. - Your section numbers at the end of introduction do NOT match the section numbers in the paper!!! - It is quite a major assumption in your model that you assume sediment concentration to be constant vertically over the water column, rather than Rouse profile. This (and the assumed suspended sediment regime) needs to be stated in the abstract. - You need to indicate early on whether your sediment transport regime considered is suspended load, bedload, or both. The way it is written right now – it looks like you are talking about suspended load, well mixed with water column (Eq. 10). You need to make this explicit to the readers from the beginning (e.g., the abstract and title). - Fig. 1 can be more schematic, and you should talk about "rainfall" in your section 2.1. As it stands right now, section 2.1 is more text-book like and does not correspond well with your figure 1. Also you may consider using ïĄň for porosity as traditionally done since p looks similar to ïĄš in the text/equations. - Fig. 2 does not look much like an erodible bed. Please try better drawing, such as using dots.

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Specific comments (there are other locations that I have not included here). - P. 2430, L. 5; takes into account the effects of - L 7. Pointed out is informal. Use something more formal English . . . " . . .models are described . . ." - L 14; events worldwide . . .. Delete "in" - L 15; dynamical mechanism - L 18; delete "the" - L 22, 26; put references here . . . whose works did this? - P. 2431, L 3; presented . . ... use past tense for previous work - L 11; change to "water surface evolution" - L 11; in time and space - L 12; just say "Our model includes . . .." - L 14; "as well as morphological changes " - L15; "research" not researches . . . just like you say people, not peoples - L 15; models of coupled . . . - L 16; interruption of what? - L 21-23; rephrase this sentence. I don't understand it. - L 224; coupled - L 25-28; you should spell out "Section". Also, section numbers don't match ones in the paper. - P. 2437, L 11; depending on - P. 2439, section 2.5 it is rather

strange that you have this small "discussions" section. Just continue the text in section 2.4. - You don't have to define the same variable over and over; for example, porosity (p) has been defined at least 3 times in the paper. - P 2439, L 9-10; state your reason why rainfall is not considered. Too fast? - P 2443, L 21 (and elsewhere) change "solid" to particle - L 22, strengthen, not "strength" - L 24, "at the bed" not "in" - Fig 3 caption; "those" of Cao - Fig 3, 4; vertical axis, misspell height - Fig 5; define k explicitly, coeff of the U bar? - P. 2444, L 10; and compared, not "are compared" - L 11; potential applications - P 2445, L 2; I don't think the relationship in Fig 5 is almost a linear one. Just use other terms.

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